Allied Telesis™

Layer 3 Switching Overview

Agenda

» Positioning L3 devices

» What is under the hood? **AlliedWare Plus™**

» SwitchBlade x908 Layer 3 Modular Switch

» x900 Series - Advanced gigabit LAYER 3+ expandable SWITCHES

» x600 - Intelligent gigabit LAYER 3+ SWITCHES

» x610 Series - Layer 3+ Network Switches

» Allied Telesis Easy Resiliency

the **solution** : the **network**
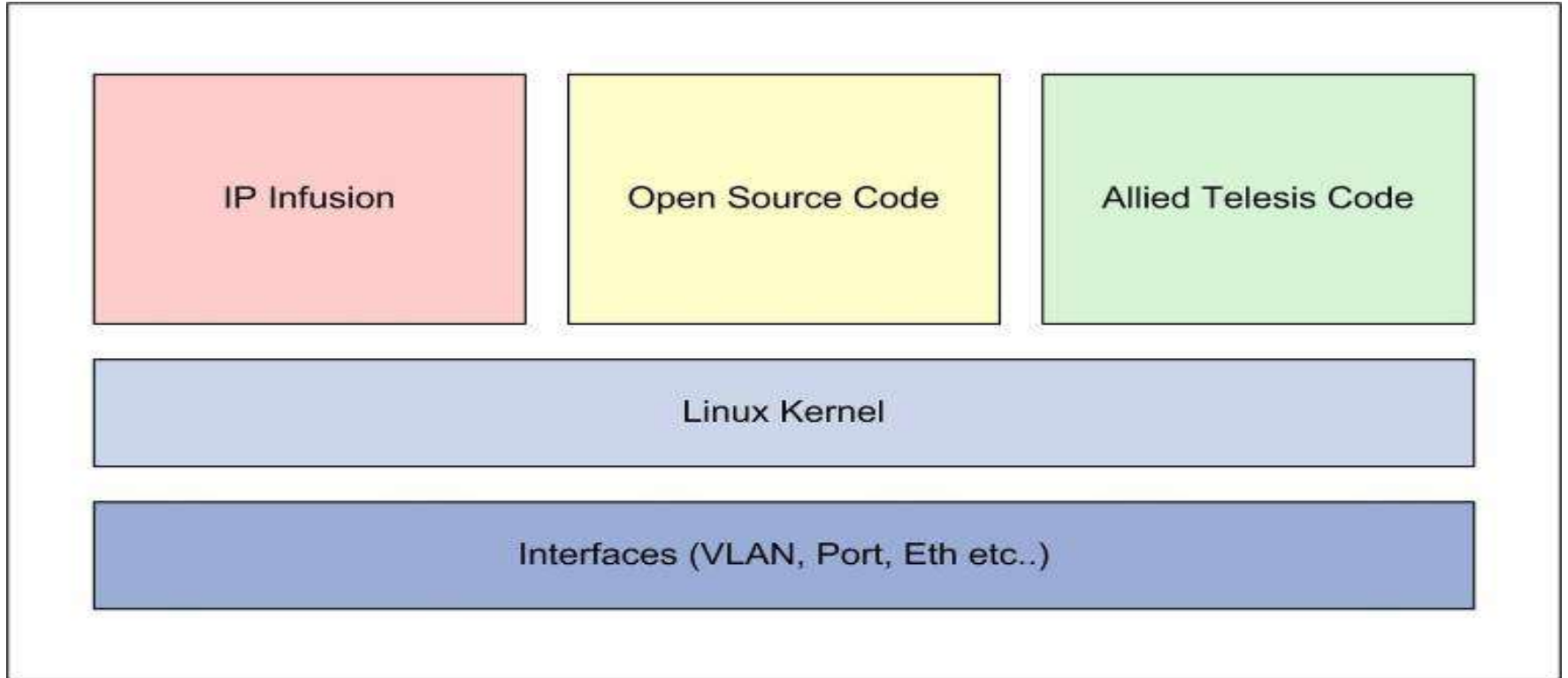
Layer 3 Switches&Routers Positioning

» **AlliedWare Plus™ Operating System Fully Featured Layer 3 OS**

» **AlliedWare Plus™** is the next generation operating system from Allied Telesis. In keeping with the increasing complexity of our feature-rich software, **AlliedWare Plus™** employs a new modular approach to software creation and distribution. It represents a quantum shift in our software development methodology, providing even more features and greater robustness from the operating system.

the **solution** : the **network**

AlliedWare Plus™ 5.4.2 - What's under the hood?

» **AliedWare Plus™** is an integration of primarily "third party software" based on the Linux operating system (http://www.linux.org/), In total, Allied Telesis engineers have written about 5% of the total code in the system, with 95% derived from third party software vendors. This saves us from writing and testing modules that are available elsewhere. Instead, Allied Telesis engineers add value by integrating the various software modules and by adding features that are not publicly available, to gain advantage over our competitors.
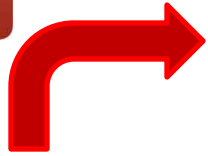
Key Features
- •Industry Standard CLI
- •VCStack™
- •IPv6 Wirespeed Forwarding
- •Policy-Based Quality of Service (QoS)
- •Network Access Control (NAC)
- •Ethernet Protection Switching Ring (EPSRing™)
- •sFlow
- •Dynamic VLAN Assignment
- •Voice VLAN

5.4.2. - What's New?
» EPSR Super Loop Protection
» Optical DDM
» PIM Source - Specific Multicast
» TACACS+ Accounting
» Up to 64 VRF-Lite domains
» IPv6 Features
» MEF Certification

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AlliedWare Plus Software License

AlliedWare Plus™ OPERATING SYSTEM

AlliedWare Plus default license

Upgrade option

Feature and Scalability

Tier	Features
IPV6 pack	IPV6 management, static routes, unicast forwarding, RIPng, MLD snooping
Advantage	OSPF, PIM-SM, PIM-DM, BGP4, VLAN double tagging (QinQ)
Basic	**Resiliency** (STP, RSTP, MSTP, EPSR,VRRP, LACP, VCS) **Security** (tri-authentication,SSH, radius, intrusion detection, private VLAN) **Convergence** (Policy QoS, WRR, LLDP, WRED, IGMP, MLD snooping) **Management** (CLI, RMON, HTTP, SNMPv3, DHCP, LLDP)

SwitchBlade x908

» Layer 3 Modular Switch **Switch**Blade® x908
  – 8 High Speed Expansion Bays
    • Highly flexible
    • Hot Swappable
  – Dual Hot Swap Power Supplies
    • High Availability
  – VCStack
    • provides excellent resiliency by allowing you to create a single "virtual chassis" from two physical devices.
  – Wirespeed Routing
    • High Performance, non blocking
    • 640Gbps Switching Fabric
    • 357 Mpps forwarding rate
  – Compact Size
    • Only 3RU tall

AlliedWare Plus™ OPERATING SYSTEM

R6 READY

VCStack™   EPSRing™   CARRIER ETHERNET MEF Certified Compliant   2002/95/EC ROHS COMPLIANT

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SwitchBlade x908

» **Scalable**

Our high speed XEMs provide both copper and fiber connectivity, delivering the ultimate in flexibility. XEMoptions are:

– AT-XEM-1XP - 1 x 10GbE (XFP) port

– AT-XEM-2XP - 2 x 10GbE (XFP) ports

– AT-XEM-2XS - 2 x 10GbE (SFP+) ports

– AT-XEM-2XT - 2 x 10GbE (RJ-45) ports

– AT-XEM-12S - 12 x 100/1000X SFP ports

– AT-XEM-12T - 12 x 10/100/1000T (RJ-45) ports

SwitchBlade® x908

MEF Certified

The SwitchBlade x908 has been certified by the Metro Ethernet Forum (MEF) Certification program, which tests products for conformance to the strict requirements of Carrier Ethernet. Specifically, the SwitchBlade x908 is certified for compliance to MEF 9 and MEF 14 Ethernet Services tests

2002/95/EC **RoHS** COMPLIANT

R6 READY

VCStack™

EPSRing™

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AlliedWare Plus™ **OPERATING SYSTEM**

CARRIER ETHERNET ✓ **MEF** Certified Compliant

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Key Solution - **VCStack - Resiliency and Stability**

The diagram shows link aggregation between the core VCStack and the edge switches. With link aggregation across ports on different virtual chassis members, there is no perceptible disruption in the case of a link failure, and the full bandwidth of the network remains available.

Fast failover ensures absolutely minimal Network downtime in the event of a problem.
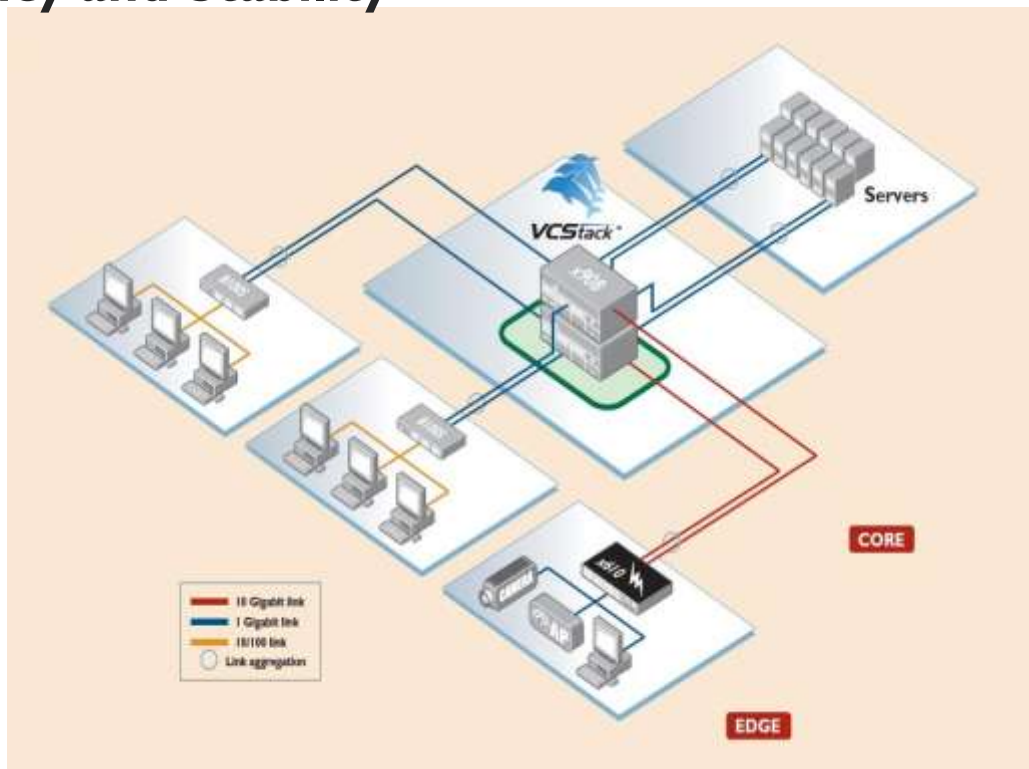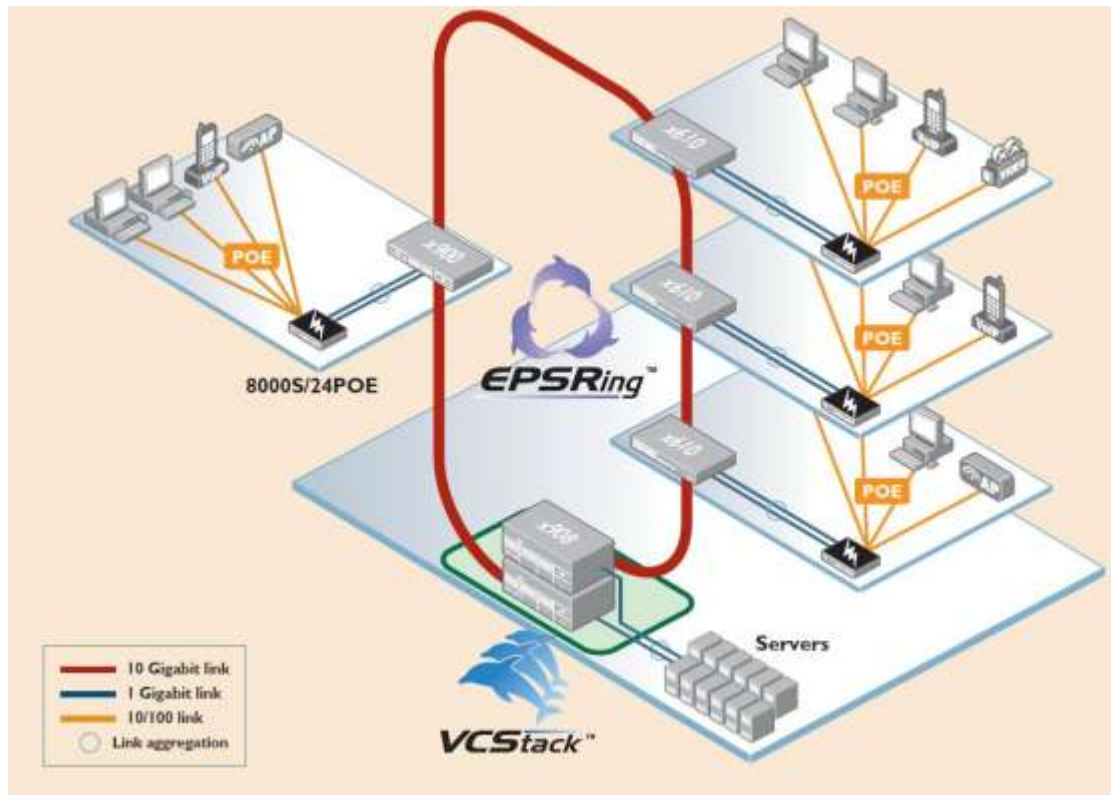
Key Solution - **EPSR - Resiliency and Fault Tolerance**

EPSR with the SwitchBlade x908 provides a high-performing, resilient network for your enterprise core. EPSR enables rings to recover within as little as 50ms, preventing a node or link failure from affecting customer experience.

The diagram shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis Virtual Chassis Stacking (VCStack) technology at the core of the network adds a further layer of resiliency, increasing the availability of critical resources.

8000S/24POE

EPSRing™

Servers

— 10 Gigabit link
— 1 Gigabit link
— 10/100 link
○ Link aggregation

VCStack™

the **solution** : the **network**

SwitchBlade x908: Increased core capabilities

» Up to 4 times capacity in terms of
- Forward DB
- L3 Host Entries
- LAG Groups

New

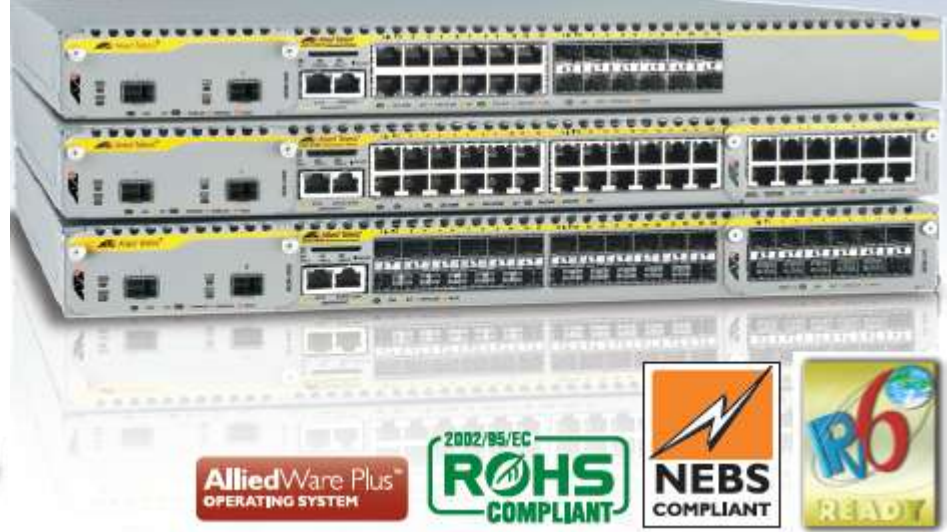**Available Q2 2012**

» AT-XEM-12Tv2

» AT-XEM-12Sv2

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Advanced gigabit LAYER 3+ expandable SWITCHES

The x900 Series of Layer 3+ switches have high-speed 60Gbps expansion bays which provide a high level of port flexibility and application versatility, unmatched by any other 1RU Gigabit Ethernet switch on the market.

x900 Series | Layer 3+ Network Switches

Advanced gigabit LAYER 3+ expandable SWITCHES

What's New?

- » EPSR SuperLoop Protection
- » Optical DDM
- » PIM Source - Specific Multicast
- » TACACS+ Accounting
- » Up to 64 VRF-Lite domains
- » IPv6 Features
- » MEF Certification

The x900 Series has been certified by the Metro Ethernet Forum (MEF) Certification program, which tests products for conformance to the strict requirements of Carrier Ethernet. Specifically, the x900 Series is certified for compliance to MEF 9 and MEF 14 Ethernet Services tests.

CARRIER ETHERNET ✓ **MEF** Certified Compliant

the **solution** : the **network**

- Guarantee delivery of business-critical data
  - » Prioritize traffic by type: voice, video, data
  - » or by class: management, engineering, support
- Full classification and prioritization at wire-speed
  - » No impact on network performance
- Easy set-up and management
  - » Roll out the same QoS policy from the edge to the core

Powerful: Best-in-Class Quality of Service

x600 Series | Intelligent Gigabit Layer 3+ Switches

Intelligent gigabit LAYER 3+ SWITCHES

The choice of 24 port and 48 port versions, coupled with the ability to stack up to 4 units, means this one switch family can connect anything from a small workgroup right up to a large business.

What's New?

» EPSR SuperLoop Protection
» Optical DDM
» PIM - SSM
» TACACS+ Accounting
» IPv6 Features

AlliedWare Plus™
OPERATING SYSTEM

R6 READY

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2002/95/EC
ROHS COMPLIANT
the **solution** : the **network**

x600 Series | Intelligent Gigabit Layer 3+ Switches

The choice of 1 Gigabit or 10 Gigabit uplink ports lets you tailor the uplink bandwidth to suit your network application. Hot-swappable XFPs provide high-speed, high-capacity fiber uplinks, with up to 40Gbps uplink capacity from each switch to the network core - so a 4-unit stack can have a massive 160Gbps of uplink bandwidth which is independent from stacking bandwidth.

PRODUCT	10/100/1000T (RJ-45) COPPER PORTS	1000X SFP PORTS	1000X SFP COMBO PORTS	10GIGABIT XFP PORTS	MAX PoE/PoE+ PORTS	SWITCHING FABRIC	FORWARDING RATE
AT-x600-24Ts	24	-	4	-	-	96Gbps	71.4Mpps
AT-x600-24Ts-POE	24	-	4	-	24 PoE	96Gbps	71.4Mpps
AT-x600-24Ts-POE+	24	-	4	-	24 PoE/12 PoE+	96Gbps	71.4Mpps
AT-x600-24Ts/XP	24	-	4	2	-	136Gbps	101.2Mpps
AT-x600-48Ts	44	4	-	-	-	144Gbps	107.1Mpps
AT-x600-48Ts/XP	44	4	-	2	-	184Gbps	136.9Mpps

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the **solution** : the **network**

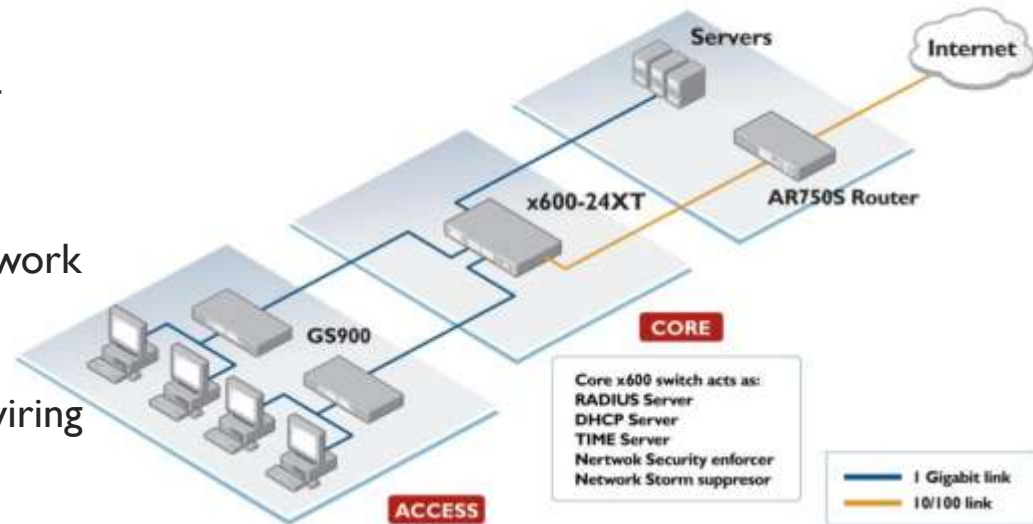**Network in a Box simplifies administration by** integrating several network services into the x600 switch:

» Radius Server checks the identity of users to keep the network safe.

» Storm Control ensures a robust network by managing the amount of traffic allowed on the network, and dealing with any unexpected surges.

» DHCP server automates the distribution of network addresses to PCs.

» A centralized Timekeeper ensures your network is always working in full synchronicity.

» Loop Protection guards against accidental wiring mistakes.

Servers

Internet

x600-24XT

AR750S Router

GS900

CORE

Core x600 switch acts as:
RADIUS Server
DHCP Server
TIME Server
Nertwok Security enforcer
Network Storm suppresor

—— 1 Gigabit link
—— 10/100 link

ACCESS

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x600 Series | Key Features

VCStack - Create a VCStack with up to four units.

Ethernet Protection Switching Rings (EPSR) - EPSR and 10 Gigabit Ethernet allow several x600 Series to form a highspeed protected ring capable of recovery within as little as 50ms.

- **Terminal Access Controller Access–Control System Plus (TACACS+)**
- **Link Layer Discovery Protocol – Media Endpoint Discovery (LLDP – MED)**
- **Industry-leading Quality of Service (QoS)**
- **Network Access Control (NAC)**
- **sFlow**
- **Power over Ethernet Plus (PoE+)**
- **Voice VLAN**
- **Optical** Digital Diagnostics Monitoring**(DDM)**

the **solution** : the **network**
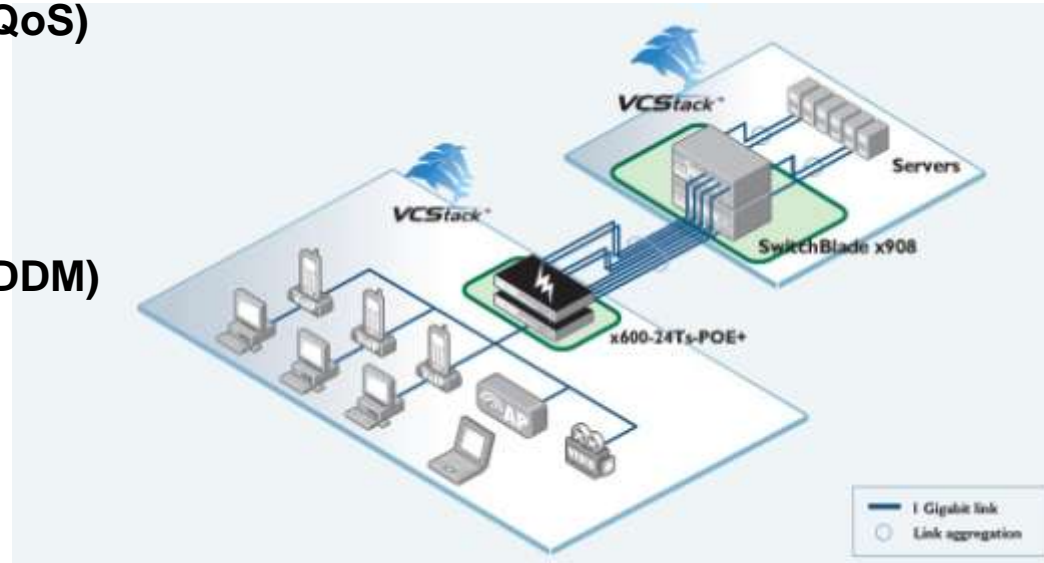
NAC automates network security policy management, allowing you to easily control network access and manage network security. NAC uses 802.1x port-based authentication in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to network security policies, and then either grant authentication or offer remediation.

Allied Telesis is also a partner with Microsoft, supporting Microsoft Network Access Protection (NAP) technology.
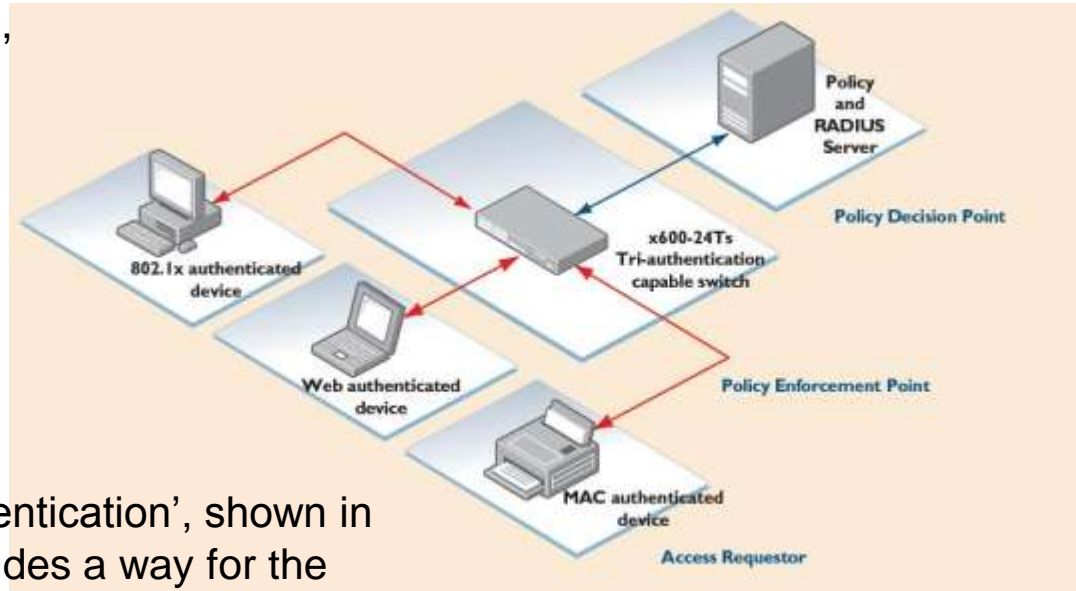
This 'Tri-Authentication', shown in Diagram provides a way for the network to successfully manage authentication of all devices.

AT-x610 series

New Product Launch

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x610 Series | Layer 3+ Network Switches

The Allied Telesis x610 Series is a high performing and scalable solution for today's networks, providing an extensive range of port-density and uplink-connectivity options.

With a choice of 24-port and 48-port versions and optional 10 Gigabit uplinks, plus the ability to stack up to eight units, the x610 Series can connect anything from a small workgroup to a large business.

The x610 Series has fully non-blocking switching on all ports, so IPv4 and IPv6 Layer 2 switching and Layer 3 routing occur at wire speed with low latency.

AlliedWare Plus™ OPERATING SYSTEM

VCStack™

EPSRing™

PoEPlus

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x610 Series | Key Features

VCStack

»Create a VCStack of up to eight units with 48Gbps of stacking bandwidth to each unit.

Mixed Stacking

» The x610 Series is compatible with the x600 Series in a mixed VCStack of up to four units.

Long-distance Stacking

» Long-distance stacking allows a VCStack to be created over longer distances, perfect for a distributed network environment.

Ethernet Protection Switching Rings (EPSRing) SuperLoop Protection enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

Power over Ethernet Plus (PoE+) PoE+ provides the capability to connect devices requiring more power (up to 30 Watts)—for example, tilt and zoom security cameras.

Virtual Routing and Forwarding (VRF Lite) allows multiple customers to share a common infrastructure, while maintaining their own independent virtual routing domains.

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x610 Models

	10/100/1000 Ports	10/1000 SFP	1000 SFP Combo	SFP+ 10G Ports
AT-x610-24Ts	24		4	
AT-x610-24Ts-PoE+	24		4	
AT-x610-24Ts/X	24		4	2
AT-x610-24Ts/X-PoE+	24		4	2
AT-x610-24SPs/X	4 Combo	24		2
AT-x610-48Ts	48		4	
AT-x610-48Ts-PoE+	48		4	
AT-x610-48Ts/X	48		2	2
AT-x610-48Ts/X-PoE+	48		2	2

Copper Switches all have 4 SFP

Except on the 48/X, where there is not enough room

24 port SFP unit has 4 10/100/1000 ports

These models have two 10G ports as standard

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x610 offers 10Gbps interfaces - How fast is 10Gbps?

» **Loading 10,000 average size web pages in 1 second = 10Gbps!**
» A web page size from 20Kbytes to 500KB (bigger than that it would take too long to load)
» Assume an average of 100Kbytes = 1Mbit
» 1000 web pages = 1Gbit
» 10,000 web pages = 10Gbits

» **Watching 6,666 BBC iPlayer HD streams = 10Gbps**
» BBC iPlayer HD stream H.264 720 x 404 pixel – 1.5Mbps
» 1,000 HD streams – 1.5Gbps
» 6,666 HD streams = 10Gbps

» **Back up 1 TerraByte of Storage Area Network in 16 minutes**
» 1TByte = 1000GByte = 10,000Gbit
» Time to pass 10,000Gbit @ 10Gbps = 1000 seconds
» 1000 seconds = 16 minutes

Improved 10Gbps Ports

Old XFP

New SFP+
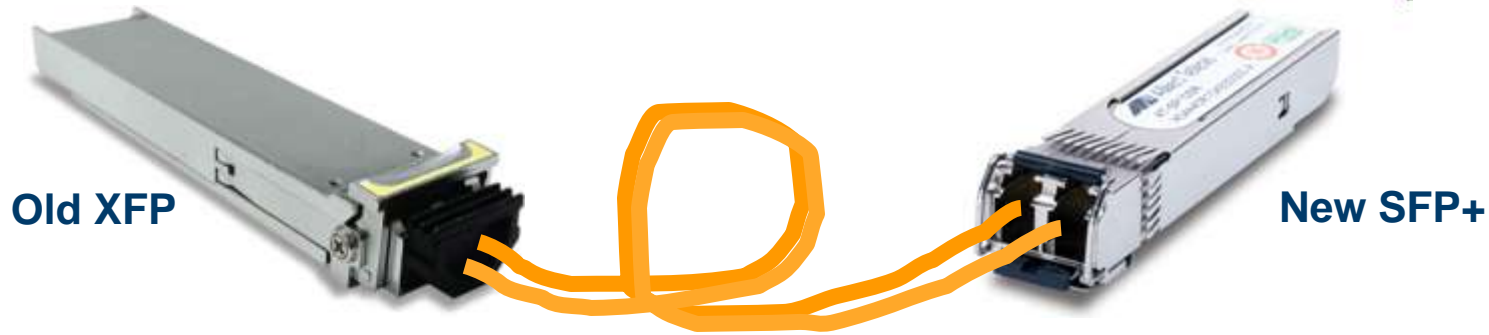
Benefits of SFP+

- SFP+ takes up less space on front panel (fit on more interfaces)
- An SFP may be fitted in SFP+ slots allowing for flexible interim solutions
- Consumes less power (XFP <1.37 Watt vs SFP+ <1 Watt)
- XFP & SFP+ currently the same price, (but XFP £?↑, SFP+ £?↓)
- SFP+'s can communicate with XFP's (850nm > 850nm / 1310nm >1310nm) both LC
- SFP+ allows low cost copper 10G connection

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SFP+ allows Low cost copper 10G interconnections.

Part Number	Description	Power Consumption	List US$
AT-SP10TW1	1m SFP+ to SFP+ cable	0.1W per end	$240
AT-SP10TW3	3m SFP+ to SFP+ cable	0.1W per end	$358
AT-SP10TW7	7m SFP+ to SFP+ cable	0.5W per end	$494

Approximately 1/10th the price of solution using optics:

Part Number	Description	Power Consumption	Each US$ List	Qty	Total List US$
AT-SP10SR	850nm 10G SFP+ 300mtrs	1W per end	$1200	2	$2400
	Fibre Patch cord		$40	1	$40
			Total		$2440

Notes: Cable can not be removed from SFP+

Sometimes referred to as "Twinax" (similar to older technology with twin co-ax)

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New Dual SFP+ Module – AT-x6EM-XS2

May be used to provide 2 additional 10G for **standalone** switches giving up to 4 x 10G
(Also use for remote stacking)

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Available number of SFP+ ports

	10/100/1000 Ports	10/1000 SFP	1000 SFP Combo	SFP+ 10G Ports	
AT-x610-24Ts	24		4		2*
AT-x610-24Ts-PoE+	24		4		2
AT-x610-24Ts/X	24		4	2	4*
AT-x610-24Ts/X-PoE+	24		4	2	4*
AT-x610-24SPs/X	4 Combo	24		2	4*
AT-x610-48Ts	48		4		2*
AT-x610-24Ts-PoE+	48		4		2*
AT-x610-48Ts/X	48		2	2	4*
AT-x610-48Ts/X-PoE+	48		2	2	4*

* With AT-x6EM/2XS module in stand alone switch

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Improved Virtual Chassis Stacking

New - x610 stacks to 8 switches

Max (384 x 1G ports + 16 10G ports)

(x600 was max stack 4)

- x610 uses AT-STACKXG stacking modules (same as x600)
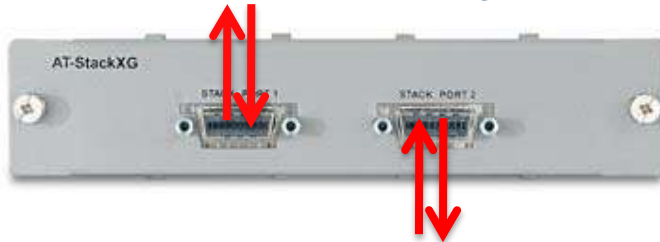
10G transmission with IP stripped = 12Gbps
12+12+12+12 = 48Gbps stacking

- "x600 stacking mode" allows combining x610 and x600 in same stack (4 in stack)

the **solution** : the **network**

New Dual SFP+ Module for Long distance Stacking

Benefits

» Can be used to provide 2 additional 10G for standalone switches

» Can be used with SFP+ optics to provide long distances stacking

» Manage local and remote switches from one GUI or console

» Protect against: Core Failure, Power failure, Theft, Fire & Flood
with a "Remote Stacked Core"

Can't mix AT-x6EM-XS2 and AT-STAKXG
Can't put AT-x6EM-XS2 stacking module into x600

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Remote Stacking – with dual homed virtual servers

Virtualise servers

Single Core switch failure - network OK
Big problems with Fire or Flood
Especially if computerised attendance

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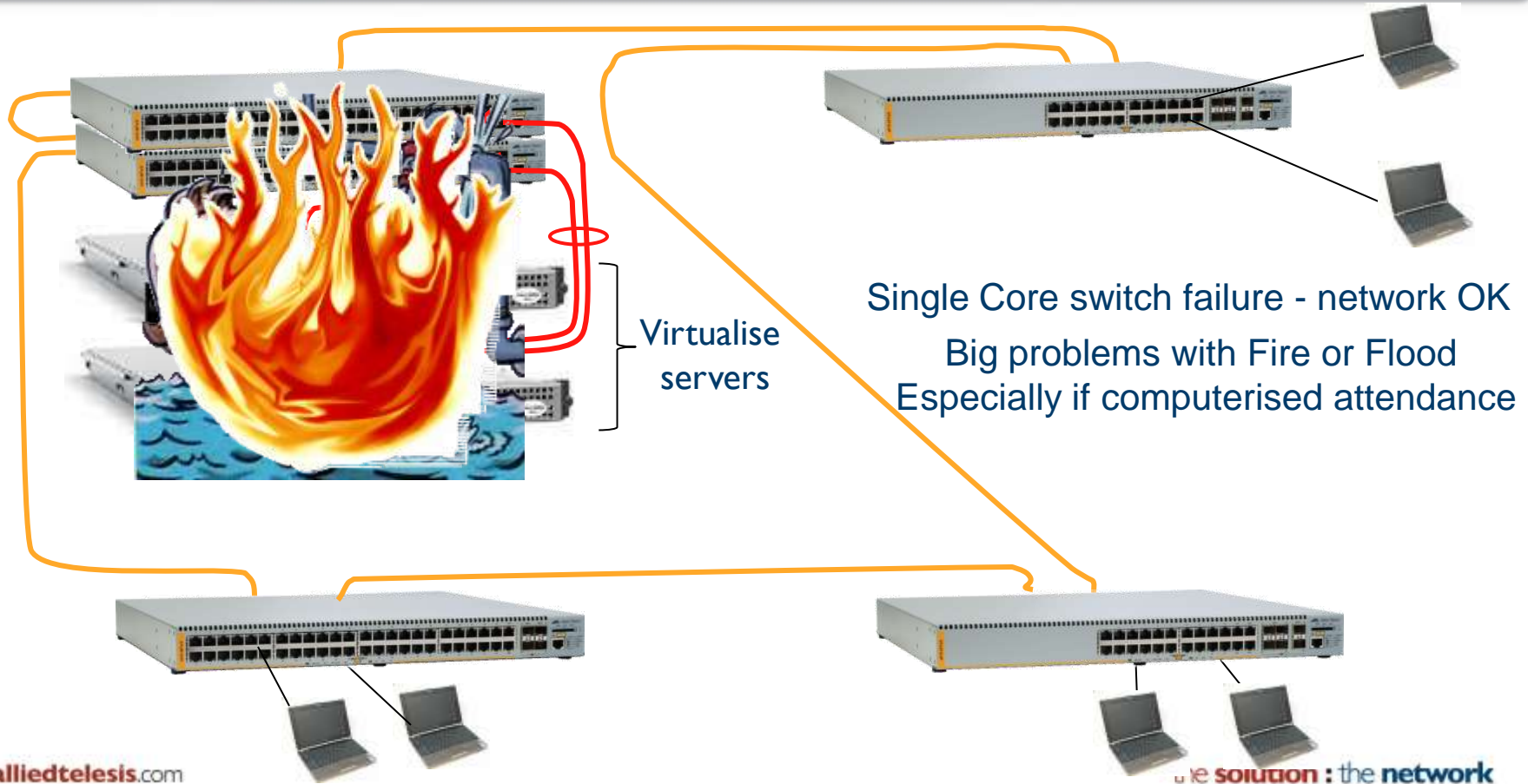
Remote Stacking – with remote dual homed virtual servers

Terrorism
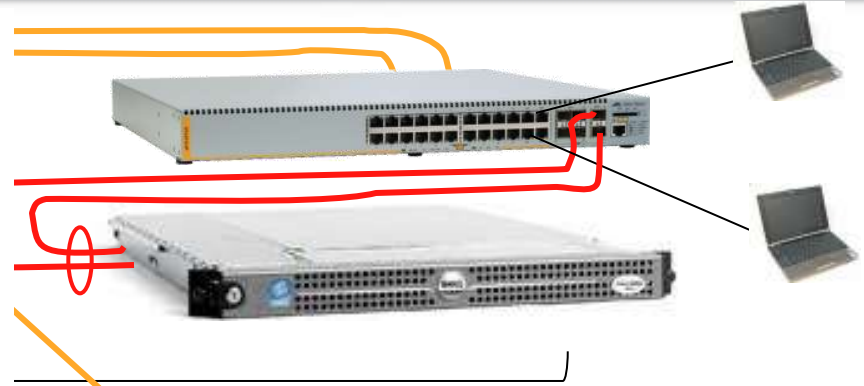
With Remote Stacking & Remote Virtulisation
With SIMPLE configuration (no VRRP)
Network becomes resilient against many disasters!

the solution : the network
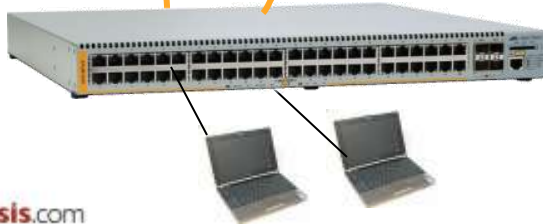
Distributed Core

Long-Distance Stacking enables the VCStack solution to provide a distributed network core. The increased distance provided by fiber stacking connectivity means that members of the virtual chassis do not need to be collocated. Instead, they can be kilometers apart. Diagram shows an example of a long-distance stack, where the single virtual distributed core ensures high availability of data for network users.

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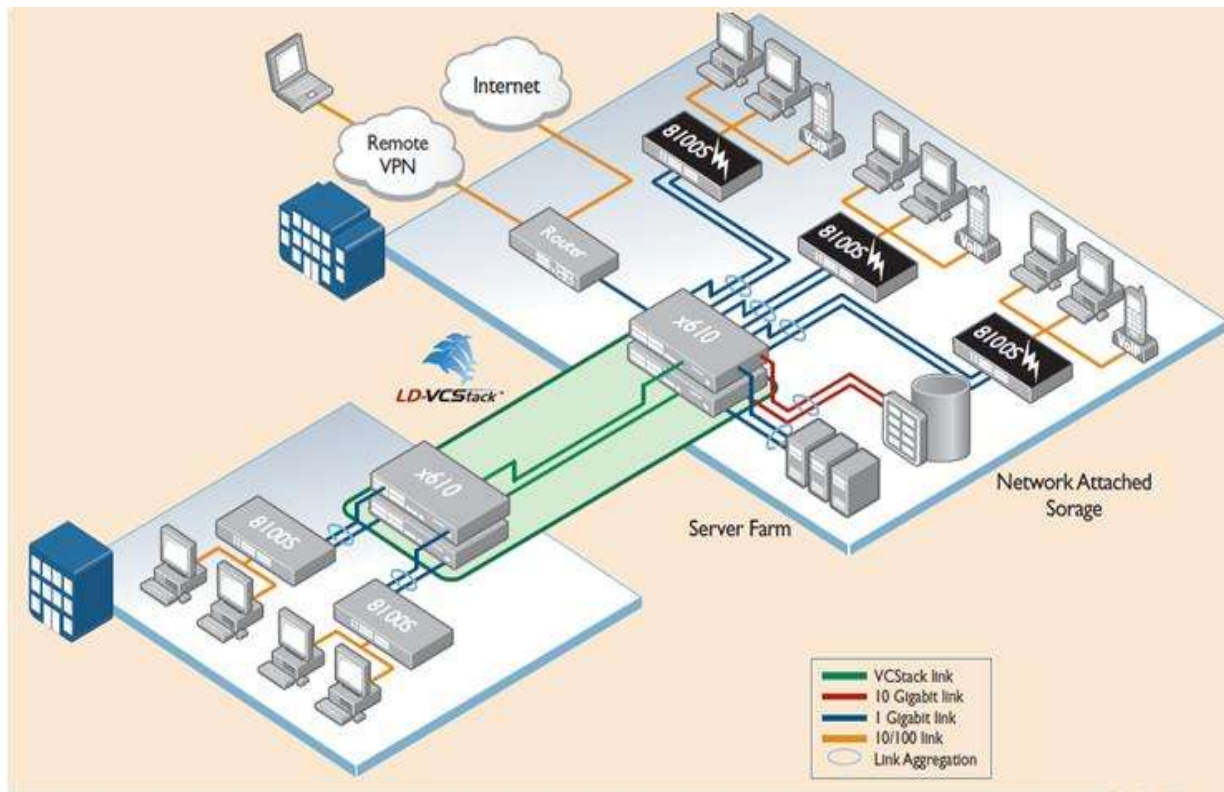
Power Over Ethernet (PoE / PoE+)

- **PoE -** provides power & data, on Ethernet Cat 3/5/6 cabling

- **x600 was PoE Capable** (IEEE 802.3af-2003)
- **PoE up to 15.4 Watts** per port (12.95 Watts at the powered device)

- **x610 is PoE+ Capable** (IEEE 802.3at-2009)
- **PoE+ up to 30 Watts** per port (25.5 Watts at the powered device)

Why PoE+

PoE illuminators

Raytec less than 25W covers up to 60 metres

Combined Fan & Heater – single Cat 6 cable to enclosure

Axis P1344E - Class 3 (15.4 Watt x 24 = 370 Watt)

Larger Pan Zoom & Tilt camera housings

Axis Q6032-E Pan Tilt Zoom - High Power PoE+ (Up to 30 Watt ea)

PoE versions of x610 have plug in Power Supply Units

x610 PoE+ models have PSU slot, allowing for choice of PoE budget
(x610 Non PoE+ models have a fixed internal system PSU)

Removable Power Supply
(PoE+ Switches)
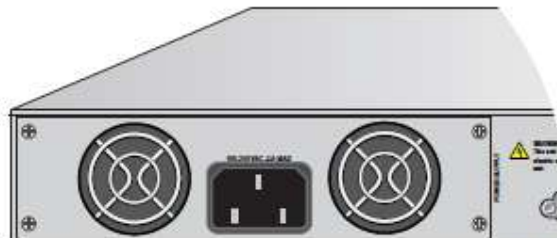
Non-removable Power Supply
(non-PoE+ Switches)

2158

No... ...e
AT-RPS3000 Redundant PSU chassis

.

the solution : the network

x610 Power Supply Module options for PoE switches

Part Number		Power Source	Description
AT-PWR250		AC Mains	System PSU only, useful if want to save cost now but might want PoE later
AT-PWR250-80		48vDC	System PSU only
AT-PWR800		AC Mains	System PSU + **480W PoE+ Power Budget**
AT-PWR1200		AC Mains	System PSU + **780W PoE+ Power Budget**

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(Note: PSUs also fit AT-RPS3000 Redundant PSU Chassis)

What is the x610 PoE+ capability?

PSU Type	PoE Budget	Number of Ports	Average Power per Port (Non Redundant PSU)	Average Power per Port (Redundant PSU)	Max PoE if some ports unused
800W	480 Watts	24	20 Watts	-	30 Watts
800W	480 Watts	48	10 Watts	-	30 Watts
1200W	780 Watts	24	Exceeds 30 Watts	-	30 Watts
1200W	780 Watts	48	16.2 Watts	-	30 Watts
800W + 800W	960 Watts	24	Exceeds 30 Watts	20 Watts	30 Watts
800W + 800W	960 Watts	48	20 Watts	10 Watts	30 Watts
1200W + 1200W	1560 Watts	24	Exceeds 30 Watts	Exceeds 30 Watts	30 Watts
1200W + 1200W	1560 Watts	48	Exceeds 30 Watts	16.2 Watts	30 Watts

Note: can't think of many applications yet that require a full 30 Watts on all ports!

The RPS-3000 has three functions:

1. **To protect against x610 system power supply failure, and**
2. **Provide additional PoE+ capability or**
3. **Provide redundant PoE+ capability**
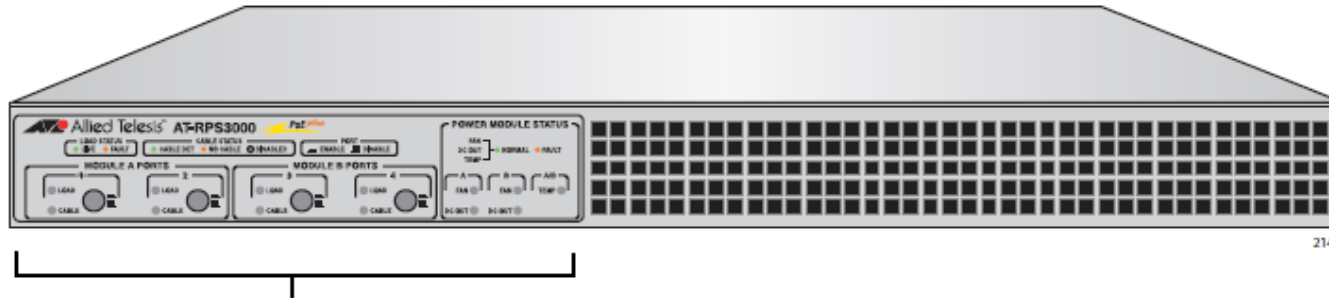
LED Panel

The RPS-3000 is not an Uninterruptible Power Supply – i.e. it does not include batteries

What can an AT-PWR800 or AT-PWR1200 RPSU supply?

PWR800 or PWR1200 in RPS3000
Supplying System & PoE Power

System power only

System & PoE Power

Two low system power consumption switches (24 port)

OR

System & PoE Power

One high system power consumption switch (48 port / SFP)

the **solution** : the **network**

Low Power & High Power Switches (Relevant to RPSU)

Low Power Switches (low system power consumption)	High Power Switches (high system power consumption)
x610-24Ts	X610-48Ts
x610-24Ts/X	X610-48Ts/X
x610-24Ts-PoE+	X610-48Ts-PoE+
x610-24Ts/X-PoE+	X610-48Ts/X-PoE+
	X610-24SPs/X

In summary:

All 24 port switches are "Low Power Switches"

All 48 port switches are "High Power Switches"

With the exception of the 24 port SFP Switch which is a "High Power Switch"

the **solution** : the **network**
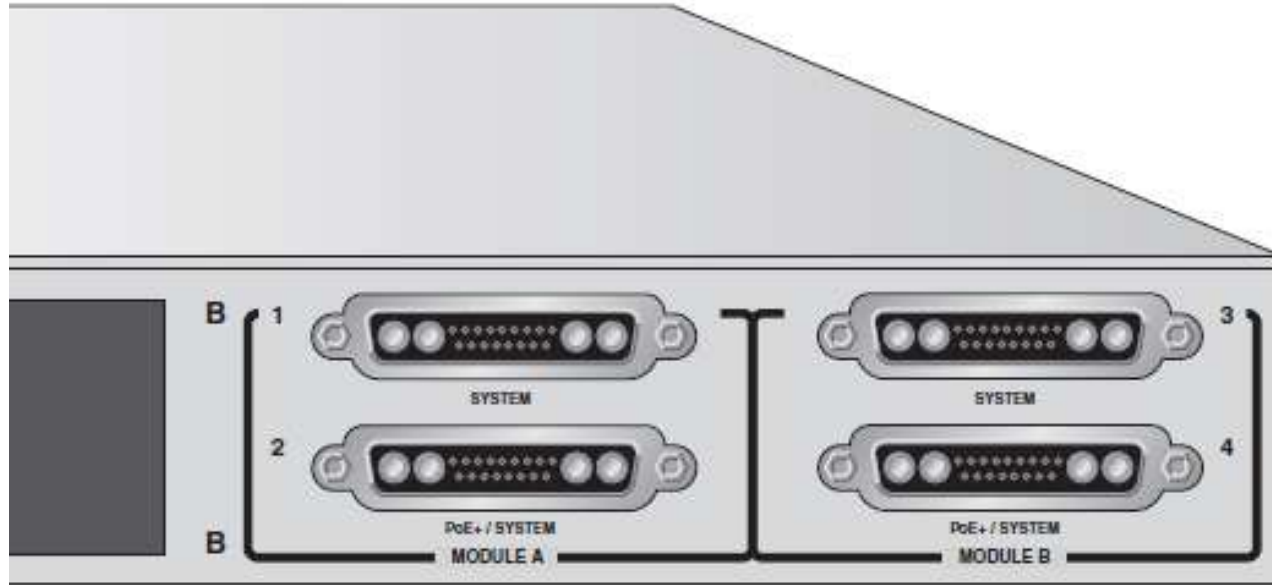
Rear connectors

All four connectors may be used to provided Redundant System Power (even to PoE+ switches)

The bottom two provide Redundant System Power and Additional / Redundant PoE+ Power

Virtual Routing and Forwarding (VRF Lite) allows multiple customers to share a common infrastructure, while maintaining their own independent virtual routing domains. Individual customers can take advantage of shared resources such as printers and Internet access via filtered inter-VRF communication, whilst maintaining absolute security.

Layer 3 network virtualization provided by Virtual Routing and Forwarding (VRF Lite) creates independent routing domains, where IP addresses can overlap without causing conflict.
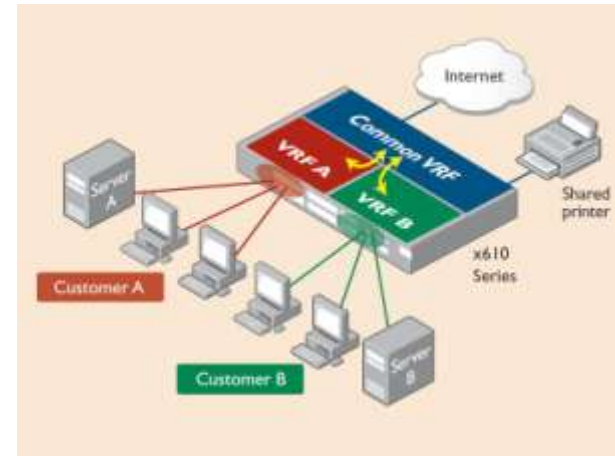
Virtual Routing and Forwarding (VRF Lite)

Tenants require a data infrastructure when renting (Regus type) flexible office space

Tenants also want to use their own IP addressing scheme

Addressing schemes may overlap (all use 192.168.1.x)

VRF Lite allows Landlords with Multi Tennant Units to offer this facility
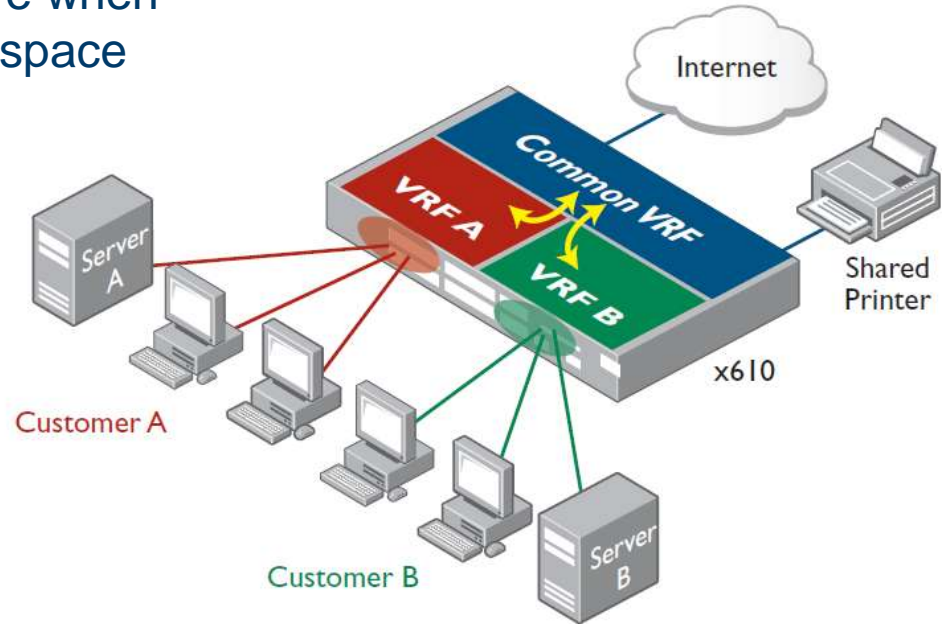
Easy Resiliency

Solution Overview

Resiliency the Easy Way VCStack approach

Traditional Approach

» Many protocols running at different layers
» Hard to configure, manage and troubleshoot

internet

RIP   OSPF

VRRP   STP
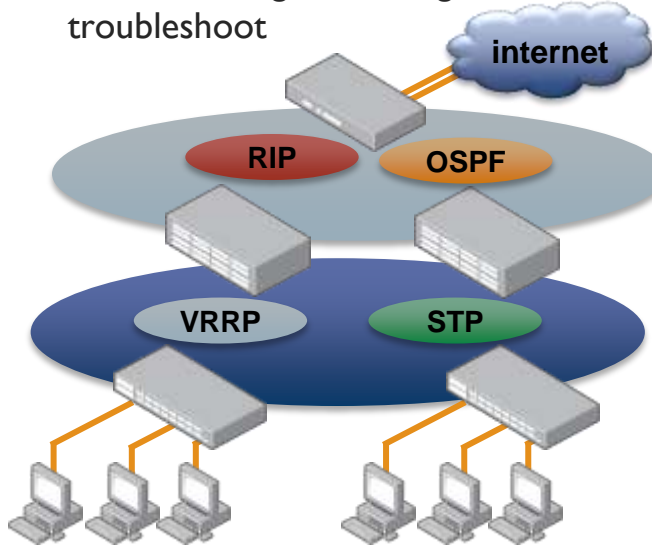
Allied Telesis resiliency

» Same on every equipment
  – Interface port 1.3.8, port 2.3.4
  – Channel group 1 mode active

internet

VCStack

LAG   LAG   LAG

Link Aggregation
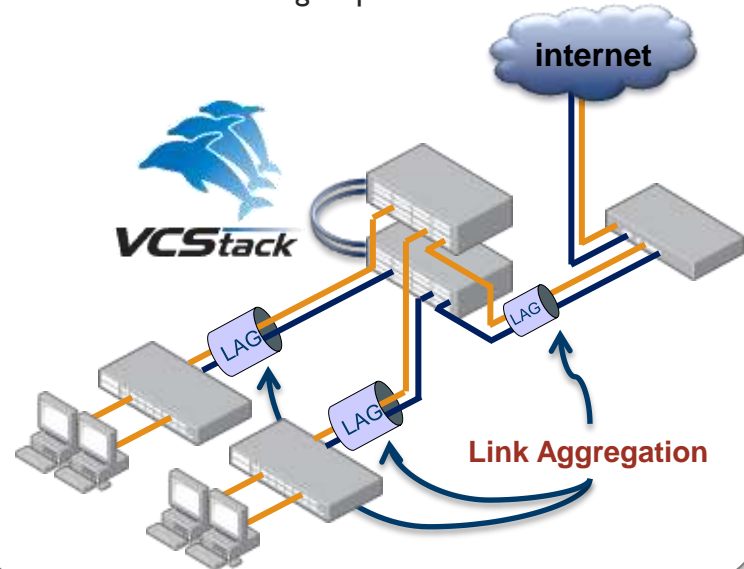
Resiliency the High Performance Way VCStack approach

Traditional redundancy

Allied Telesis resiliency

Active-Stand by
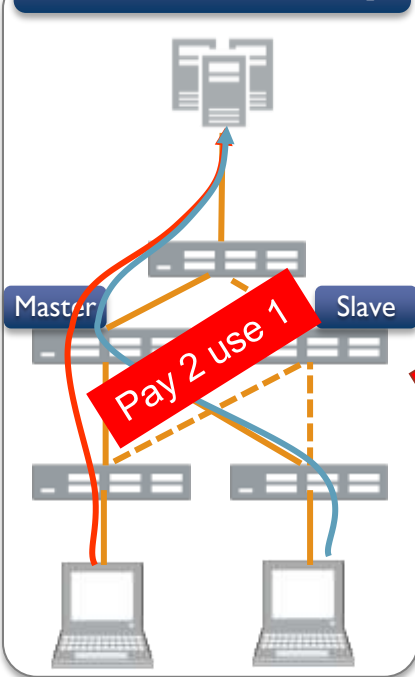
Active-Active
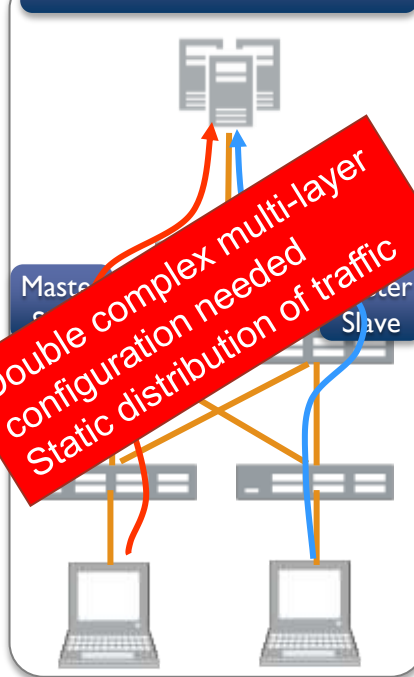
True Active-Active

Master

Slave

Pay 2 use 1

Master
Slave

Master
Slave

Double complex multi-layer configuration needed
Static distribution of traffic

VCStack
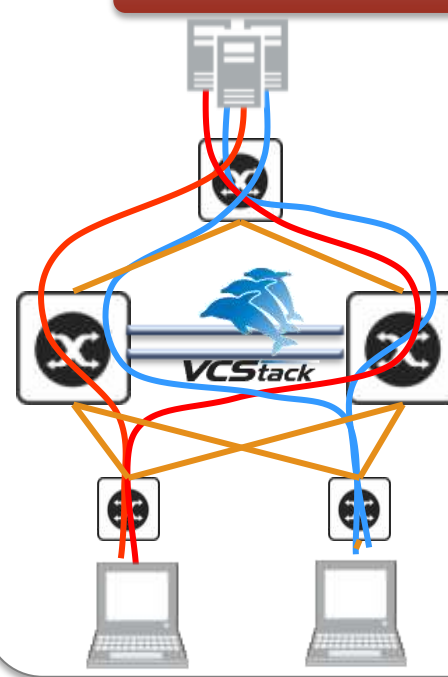
Full bandwidth used all the time

Fully dynamic load distribution

Easy scalable bandwidth

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the solution : the network

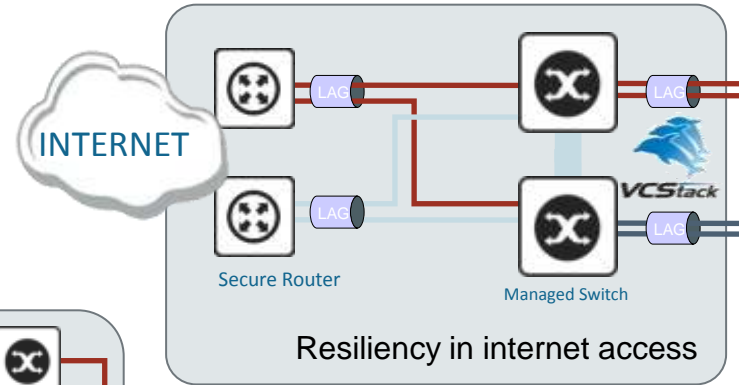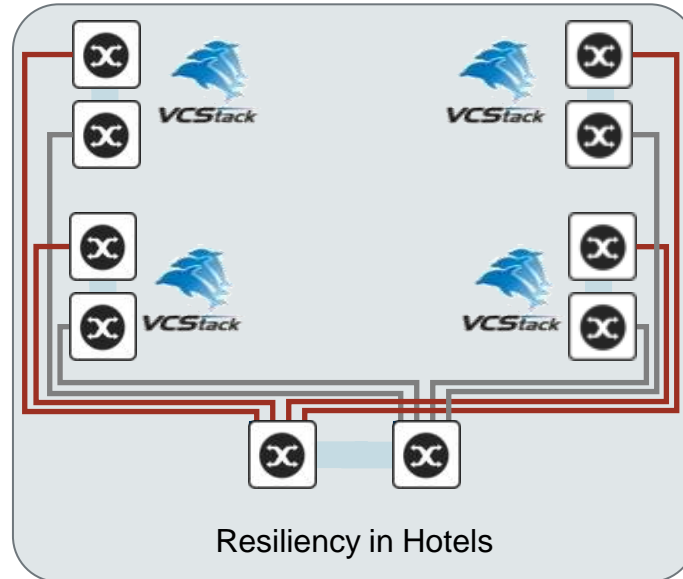# The Ring in the Video Surveillance

EPSRing
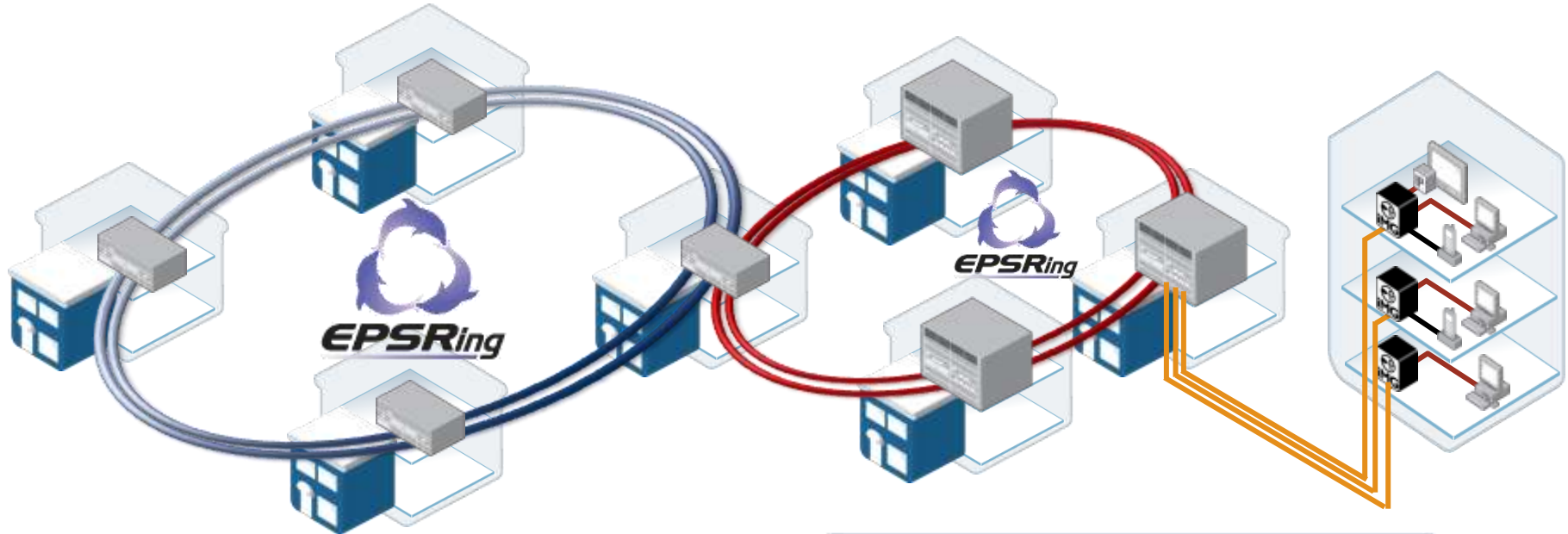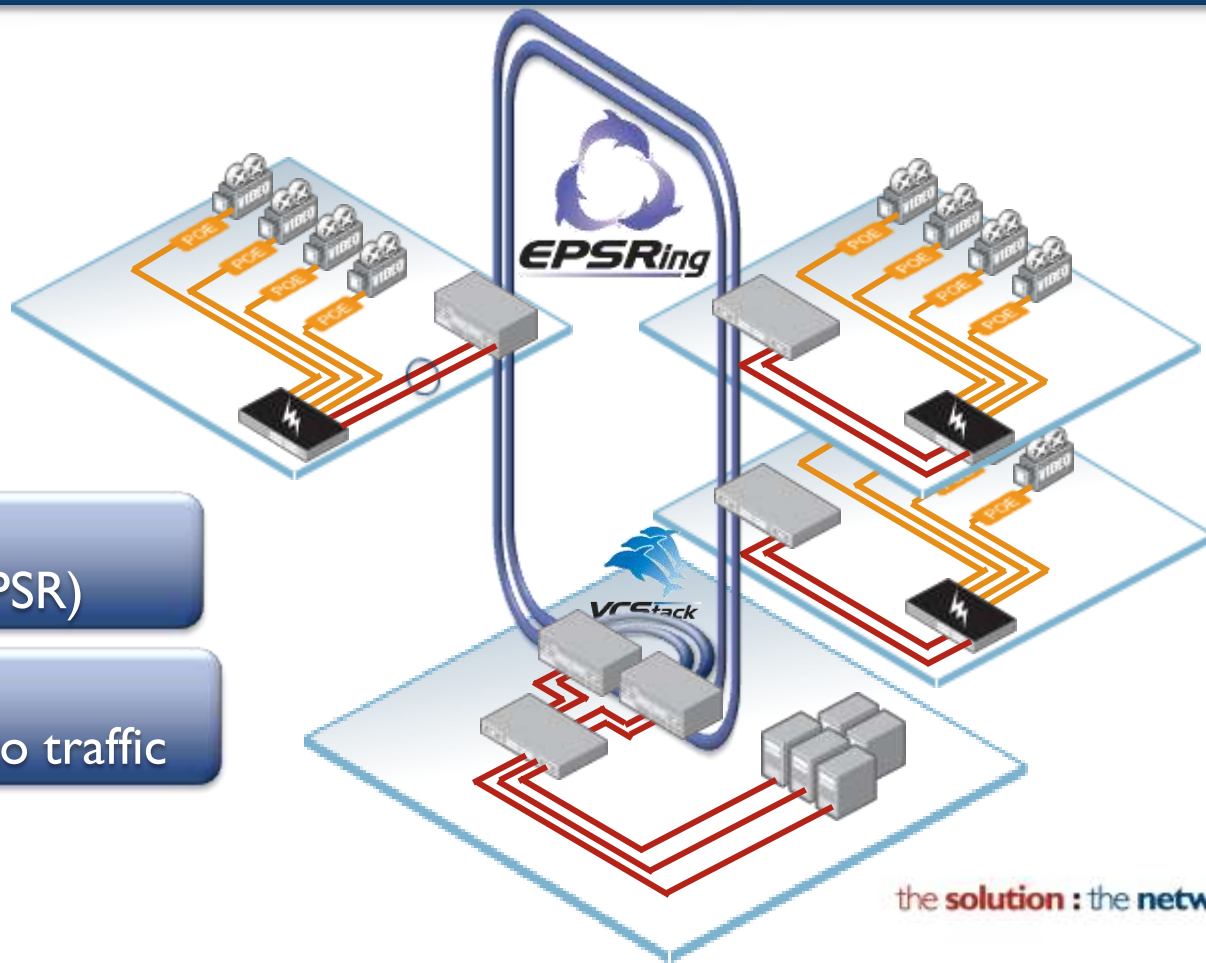
Easy to configure
10GbE carrier-grade (EPSR)

Affordable Cost
Fast sub-50ms failover to traffic

VCStack
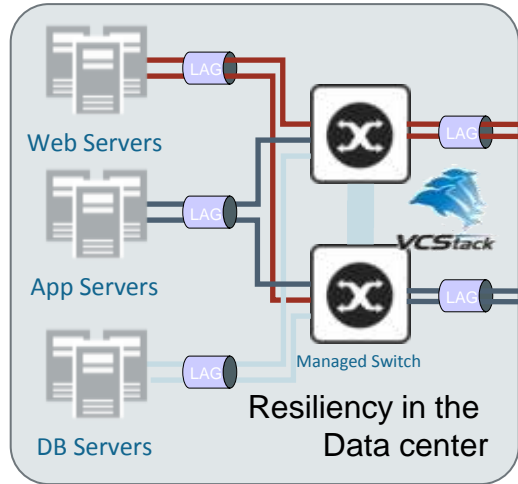
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the solution : the network

Resiliency Everywhere

Web Servers

App Servers

DB Servers

Managed Switch

VCStack

Resiliency in the
Data center

INTERNET

Secure Router

Managed Switch

VCStack

Resiliency in internet access

VCStack

Resiliency in Hotels

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the solution : the network

Thank you